

**P.E.S. College of Engineering, Mandya - 571 401***(An Autonomous Institution affiliated to VTU, Belagavi)***First Semester, B.E. - Semester End Examination; Dec. 2019****Engineering Chemistry***(Common to all Branches)**Time: 3 hrs**Max. Marks: 100***Note:** i) **PART - A** is compulsory. **Two** marks for each question.ii) **PART - B:** Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.

Q. No.	Questions	Marks
I : PART - A		10
I a.	Define Octane number and Cetane number.	2
b.	Write half cell and net cell reactions of H ₂ -O ₂ fuel cell.	2
c.	Write the synthesis of Thermo-Cole and its applications.	2
d.	Why metals or alloys undergo corrosion?	2
e.	Mention the applications of liquid crystals in electronic instruments.	2
II : PART - B		90
UNIT - I		18
1 a.	Define HCV and LCV. Explain the determination of calorific value of solid fuel using Bomb's calorimeter.	9
b.	What is meant by knocking? Explain the mechanism, ill effects and mention the prevention of knocking.	9
c.	State the phase rule equation. Discuss the application of phase rule for one component system like water system.	9
UNIT - II		18
2 a.	Describe the origin of electrode potential. Derive the Nernst's equation for single electrode.	9
b.	Discuss the following properties of battery :	
	i) Voltage ii) Energy efficiency	9
	iii) Cycle life iv) Shelf life v) Energy density	
c.	Illustrate the construction and working of H ₂ -O ₂ fuel cell and Zinc air battery.	9
UNIT - III		18
3 a.	Define corrosion. Describe the differential metal corrosion and differential aeration corrosion.	9
b.	How corrosion is prevented by proper selection of materials and proper design of the equipments?	9
c.	Differentiate electroplating and electro-less plating. Illustrate the electro-less plating of copper on PCB.	9

UNIT - IV**18**

- 4 a. Define Tg. Explain the factors effecting Tg and mention the significances of Tg. 9
- b. How the following polymers are synthesized? 9
- i) Polyurethane
 - ii) Epoxy resin
 - iii) Poly Carbonate
- Also mention their applications.
- c. Describe the Vulcanization and compounding of rubber. 9

UNIT - V**18**

- 5 a. What are boiler scales? How they are formed? Explain the ill effects of boiler scales. 9
- b. Illustrate the sewage treatments. Calculate the COD of effluent sample when 25 ml of an effluent sample required 9.8 ml of 0.025 MK₂Cr₂O₇ solutions for complete oxidation. 9
- c. Discuss the applications of liquid crystals in electronic instruments and thermo graphy. 9

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